DOCUMENT RESUME

ED 313 025 IR 014 079

AUTHOR	Hale, Robert; And Others
TITLE	Electronic Learning.
INSTITUTION	Connecticut Association of Secondary Schools, Hamden.
PUB DATE	Sep 88
NOTE	26p.
PUB TYPE	Reports - Descriptive (141) -- Guides - Non-Classroom Use (055)
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	Administrators; *Databases; *Distance Education; Elementary Secondary Education; Equal Education; *Information Retrieval; Interactive Video; Media Specialists; *Online Searching; Program Descriptions; *Telecommunications
IDENTIFIERS	DIALOG; Dow Jones News Service; EINSTEIN (Online Service); Interactive Audio; Interactive Television; Wilsearch

ABSTRACT

The Connecticut Association of Secondary Schools has worked with the Elementary and Middle School Principals Association of Connecticut, the State Department of Education, and the Connecticut Principals' Academy to bring to the awareness of administrators throughout the state new developments in electronics technology that have significance for educators. Four efforts to offer one-day conferences have failed because of insufficient enrollment. This two-part monograph presents much of the information that the conference was intended to present. Focusing on distance education, the first part provides background information on the delivery method and descriptions of distance education projects throughout the state, including the application of specific technologies, i.e., interactive video, interactive audio, and interactive television. The second part, which addresses online data retrieval skills, focuses on four different online services that are currently in use in some Connecticut schools: Dow Jones News Service, DIALOG, WILSEARCH, and EINSTEIN. Names and addresses of contact persons in selected schools and addresses of the online database service companies are appended. (GL)

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ED313025

ELECTRONIC LEARNING

By

Robert Hale
Robert Markarian
Philip Morton
Gwen Brooks
Eugene Lynch

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Acknowledgements

The Professional Studies Board wishes to thank the Connecticut Principals' Academy, the Elementary and Middle School Principals Association of Connecticut, and the Connecticut State Department of Education for assistance in offering conferences on this topic.

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FOREWORD

For the past two years the Connecticut Association of Secondary Schools has worked with the Elementary and Middle School Principals Association of Connecticut, the State Department of Education, and the Connecticut Principals' Academy to bring to the awareness of administrators throughout the state new developments in electronics technology which have significance for educators. Four efforts to offer one-day conference on Electronics Learning have failed because of insufficient enrollment.

We on the CASS Professional Studies Board believe in the importance of this new educational technology and therefore offer this monograph in the hope that much of the information the conferences were intended to present can be made available herein.

The monograph consists of two sections: the first dealing with distance education and the second with on-line data retrieval. We gratefully acknowledge the efforts of Robert Hale, Robert Markarian, Philip Morton, and Gwen Brooks who wrote the first section of this monograph, and of Eugene Lynch who wrote the second part. These are a few of the many educators in Connecticut who have already taken leadership in introducing these new technologies into their schools' programs.

Gary Burgard
Wethersfield, Connecticut
July, 1988

PART ONE

Distance Education: An Opportunity for Equity of Access to Instruction

The use of the telephone, radio or television (examples of telecommunication technology) in our schools and classrooms is nothing new. For years we have expanded the opportunity of our students and teachers by the effective utilization of these basic technologies to provide homebound instruction, participate in events at remote locations in real time and listen and/or see great performances as a part of our instructional program. The advent of the audio cassette and video cassette have made the use of both audio and video programs even more convenient and effective.

What is the difference between what we have been doing and the concept of distance education? The following is a working definition of distance education:

> Distance education is the sharing of instruction among two or more sites using telecommunications technology while providing for interaction among the participants.

The important distinction between the traditional use of telecommunication technology and distance education is the provision for interaction between and among the participants. There is a place for the traditional use: instructional television, instructional radio, commercial broadcasting and now satellite broadcasting, of telecommunications. The use of this technology is still a cost effective and convenient method to provide a vast range of learning resources and materials to our students and teachers. The potential for distance education, with its capacity for interaction, is limited only by our imagination.

This publication will describe several projects in Connecticut making use of telecommunications for distance education. There are similar activities taking place all across the country.

It is important to understand that distance education can use one of several approaches to deliver interactive instruction to the student(s):

West Hartford Distance Education Project

Full motion and slow scan interactive television; the origination site can talk with the remote site in real time and see the remote site with a new picture every 10 to 30 seconds. The remote sites can see and talk with the origination site in real time.

Manchester High School Distance Education Project

Interactive audio and digital; both the origination and remote sites can talk to each other and share digital information in real time.

ACES and Somers/East Windsor Distance Education Project

Full motion interactive television; both the origination site (teacher location) and the remote sites (student location) can see and talk to each other in real time.

Typical Audio Conference Call

Interactive audio; both the origination and remote sites can talk to each other in real time.

Typical in Business and Industry

Compressed interactive video; both the origination and remote sites can see and talk to each other in real time with the video compressed thus providing near full motion video.

Typical of National Distance Education Projects

Interactive audio passive video; the origination and remote sites can talk with each other in real time and the remote sites can see the origination site in real time.

In addition to the several applications listed above, there are many variations which employ different combinations of telecommunications technology. Each application is used to meet the particular needs, conditions and constraints of the local district. Without question, the best method of instruction is the live teacher working directly with students. The options presented by distance education are available when it is not possible to offer the instruction by the traditional method. Several of the Connecticut projects are described in this publication.

The State Department of Education provides assistance to school districts which are interested in applying telecommunications technology to distance education through consulting services and the Telecommunications Incentive Grant Program. For further information, please contact the Learning Resources and Technology Unit of the State Department of Education, P. O. Box 2219, Hartford, Connecticut 06145, or telephone 566-2250.

Robert Hale
Connecticut State Department
of Education

West Hartford Distance Education Project

During the 1984-85 school year, the Media Services Department of the West Hartford Public Schools was directed to prepare a plan for the sharing of instruction between its two high schools (Conard and Hall) employing instructional technologies. The impetus for this decision was to identify a means by which courses with low enrollments could continue to be offered, particularly an introductory course in the Russian language.

Hall High School was an origination point for cable public access. This provided the means for sending a live, color audio/video signal to Conard High School. The problem was to identify a means of returning audio and video signals to Hall.

Southern New England Telephone suggested the use of conferencing telephones to provide the return audio "link". This very low cost solution was implemented in September of 1985 when the West Hartford Public Schools offered Russian 1, 2 as a teleconferenced course between Conard and Hall High Schools. It was a high risk solution in that the instructor, who was teaching from Hall, could not view the students at Conard and the audio signal from Conard was not of the highest quality. Nonetheless, instructional teleconferencing was introduced and classes proceeded.

Working closely with SNET, an inexpensive solution to the return video signal problem was identified. Using "slow scan" video transmission technology, provided by Colorado Video and standard voice quality phone lines, a black and white still picture that changed every 35 seconds was transmitted from Conard to Hall. The teacher who had been teaching for four months without actually seeing the students at Conard, could now view the entire remote classroom. A fully interactive audio/video system for instructional teleconferencing was now in place.

During the summer of 1986, Colorado Video introduced a new "slow scan" transmitter that greatly improved the quality of the image

being sent from Conard. Funding was provided to purchase improved audio teleconferencing equipment from the DAROME Corporation.

The West Hartford Public Schools now offer five courses daily using this interactive instructional teleconferencing equipment. The courses are:

Russian 1, 2; Russian 3, 4; German 1, 2;
German 3, 4; and Chinese 1, 2.

A short video presentation has been prepared showing the technical and instructional aspects of our program.

Robert Markarian
West Hartford Public Schools

Manchester High School Distance Education Project

With money awarded from telecommunications grants from the Connecticut State Department of Education, Manchester High School is piloting distance learning programs using an interactive computer system. The first program being tried is one using the system for students on homebound instruction.

Each year we have students who are placed on homebound instruction for periods from three weeks to an entire school year. During the 1986-87 school year we provided 1,328 hours of tutoring for 22 high school students at a cost of $17,300. Two of these students were homebound for the year and received 497 hours of instruction at a cost of $6,460. Not only is this costly for the district, but more importantly, students miss a great deal of the interaction that takes place in the classroom.

With grant money last year, we set up a demonstration project using rented equipment. Two teachers and a homebound student were trained to use the equipment and classes were conducted for several days using the system. All of the participants (including the students in the classroom and parents of the homebound student) gave the program a positive evaluation. However, because of cuts in our funds, we were not able to purchase a large color monitor or an overhead projection system which we consider necessary for the classroom. During our pilot project, the students were able to communicate with the homebound student and she with them, but the size of the computer monitor prevented all students in the classroom from reading the monitor screen. The teachers both felt this was an inconvenience that should be corrected.

The equipment needed to set up this sytem is two IBM PS2, Model 30 computers, Optel Telewriter 2 PC software, 2 Telewriter tablets, 2 Voice-Two modems, 2 voice activated speakers, and a large (35") color monitor or an overhead projection system. The classroom must be equipped with or have access to a telephone line. The Voice-Two modems have the capability of transmitting voice and

data over phone lines simultaneously. This permits the student off-site to listen to the teacher and receive data on the computer or tablet at the same time.

This is a completely integrated system and the teacher has the option of using the tablet or the computer keyboard as desired. The tablets have been dubbed "smart" and "dumb" by the company -- this is not in reference to the intelligence of the users, however! The "smart" tablet allows the teacher to control the system on-site. She can input, store, or use the tablet in the same manner as she uses the keyboard. The "dumb" tablet permits the off-site user to instantly convey drawn or written material to the classroom.

The teacher can prepare lesson off-line, store the pages, and call them up as needed in the class. During class, the teacher on-line can write on the tablet or type information into the computer and it is displayed instantaneously on the large monitor in the classroom and to the students' computer off-site.

Most of our students are computer literate and we found that within 15-20 minutes the homebound student was able to use the system. Should something go wrong at the student site, the student is still able to keep in touch with the classroom over the phone lines, and the teacher can communicate with the student to straighten out a problem which might arise with the student's operation of the computer.

We found there are many advantages to this system and many possible uses. We decided to first try it with the homebound student to study its feasibility for this purpose and to experiment with the system. The student and the teachers who have worked with it were very pleased and found it easy to work with. However, because we were not able to secure all the funding asked for in our grant proposal, we had to "make-do" with two inexpensive speakers and without a large screen monitor. We hope to have a large color monitor soon and money to buy more expensive speakers which will improve voice-quality and dependability.

As we worked with the homebound student, we realized it could be very useful with elementary students who are homebound, perhaps more so than for high school students. Elementary students are with one teacher for the entire day, therefore the equipment would not have to be moved from one classroom to another.

We plan to explore many other uses with the system. We have talked with, and viewed a videotape from BOCES, New York in which they show the system being used with AP students. The system can be bridged and can be used over local or long-distance phone lines. A member of our science department is planning to try bridging to several sites throughout the state to share information and meetings with other physics teachers. We are also beginning discussions with other school districts to explore the possibility of sharing a teacher(s) to teach languages such as Japanese or Chinese in which the enrollment is likely to be small at each site. Sharing costs might make this or other courses available to students when we might otherwise not be able to offer them. We feel certain that we will discover many other uses as we begin using the system regularly.

Gwen H. Brooks, Ph.D.
Manchester High School

ACES and Somers/East Windsor Distance Education Project

In these fast changing times of technological advances, education has been somewhat slow to jump on the band wagon. Some of us have been forced into "distance learning" or "telecommunication" quicker than others in order to survive.

Facing declining enrollment, (50 percent in an eight-year period), we in East Windsor were looking at many programs which were in danger of being eliminated -- advanced classes in a variety of curricula areas such as calculus, French V, Spanish V, Shorthand II, transcription, Music Theory, etc. We needed to explore shared programs with other schools in similar situations. We looked at traditional means of sharing classes between schools, but a variety of usual roadblocks existed, not limited to, but including, transportation problems of both teachers and students, wasted time in moving either, student concern over leaving the nest, as well as the ongoing problems created when two or three schools have to develop common scheduling patterns.

We had to look at other alternatives in order to run a shared program which might have the chance of being successful. By making contact with our local cable company (Continental Cablevision), we discovered two channels had been put aside for our ten-town region for public education programs. They were virtually unused, and Continental Cablevision was anxious to pilot a program which could demonstrate further uses of cable in our region.

Taking advantage of funding from several state grants, "Inter-district Cooperative Programs" and "Competitive Telecommunication Incentive Grants", we were able to purchase approximately $40,000 worth of equipment for the Somers and East Windsor school districts in the fall of 1986. (Funding was received for 1987-88 and has been applied for in 1988-89.) Working closely with Continental Cablevision, we set up two sites, one at each high school, and embarked on our first pilot classes during the winter and spring of 1987.

As usual, we encountered a number of technical and organizational pitfalls. The technical problems, thanks to our hard-working project director, Peter Stone, and Continental Cablevision, were easier to resolve than the organizational problems.

Operating with an advisory board from the ten-town area required patience and resolution of a number of issues such as a common, working memoranda between the Somers, East Windsor, and later East Granby Teachers Association on how we would handle teaching assignments, evaluation and job security; these almost became major stumbling blocks. Establishing times when common classes could be taught and aligning bell schedules are always the downfall of cooperative programs, but these issues were resolved; and in the fall of 1987, our first four courses for credit were offered between East Windsor and Somers. French IV and Music Theory originated from Somers High School and Shorthand I and II from East Windsor.

Least of our problems were the teaching of the course in each site by competent teachers and problems encountered by students taking the courses. Needless to say, teachers found the use of the equipment of little difficulty and took to it like ducks to water. Students quickly learned who their remote classmates were, and the process of teaching by telecommunication doesn't appear to enhance or deter from the teacher-student learning process.

There is no question some courses are more suited for this medium than others, but the uses of the medium have unlimited potential for small school districts not only in sharing classes but in professional development. As state monies dry up, the true test of our program's success will come when local boards must pick up the ongoing cost of equipment purchases and cable cost which up to this time has been free.

Project Goals for 1988-89

Include completion of the technical set-up of three cable classrooms in three different high schools to show two

cable channels, and allow one site to originate classes for more than one remote site.

Sharing a full semester class between all three districts.

Employment of a part-time technician.

Development of in-service programs which can be shared by the three districts.

Establishment of appropriate procedures, teachers contract provisions and organizational structure so that the project can continue as a regular program of the participating school.

Anticipated Benefits Are Not Limited to But Include:

Sharing instruction between schools. The program has the potential to preserve and expand the education program for students.

Having access to teleconferences and other learning opportunities through satellite transmission.

Sharing in-service professional development as well as after-school conferences.

Presenting information to the communities in several forms, including video text, adult education programs, live meetings and call-in panel discussions.

Limitations That Must be Recognized Are:

Not all courses can be offered in this way. Courses which require special apparatus or special supervision may not be appropriate for cable delivery.

The number of students served by cable classes is limited.

Cable channel space is limited for educational purposes; there may be competition for the use of these channels in the future.

Non-Monetary Project Requirements Are:

The participating school system must work toward adopting a common school schedule, including yearly claendar, class schedules, in-service days, marking periods, examinations, etc.

In planning cable course offerings, the program needs of each school should match up with cable class offerings as much as possible.

Representation from participating towns to the project advisory board should continue.

Teacher associations and boards of education should continue to develop working relationships that address new situations as they occur.

Future Expansion

The use of the cable classroom has far reaching implications for all of us. Business and industry have used teleconferencing successfully for years and there is little reason, barring financial limitations (new systems joining us will have an initial outlay of about $20,000 and must be from the ten-town region), for school systems not to use this process. Indeed, its use is not limited to school systems suffering from declining enrollment but offers technological uses that all school systems could utilize with cooperation from their local cable company.

Philip Morton
East Windsor, Connecticut

PART TWO

Online Data Retrieval-Basic Skills for the 21st Century

One of the basic goals of education is to enable students to become productive members of society by having acquired certain requisite skills. There is little disagreement about the importance of those basic skills we refer to as "the three R's" and indeed growing concern about the significant number of Americans who are functionally illiterate. At the same time there is a realization that in order to take active part in a democratic society our children must learn to become decision-makers who can gather, analyze, synthesize and evaluate information.

Realizing the key role that access to information plays in this process, a number of Connecticut school districts have focused attention on their K-12 library/media/technology programs. These districts are questioning if they provide the staff, facilities, materials and instructional experiences that enable students to become literate, life-long learners with information processing skills. Even those districts with strong programs are forced by the tremendous explosion in information to look beyond traditional (print) means of information access and are therefore turning to online information retrieval to help meet this challenge. This presentation will attempt to answer some of the questions administrators have concerning the introduction of online information technology and will focus on four different online services which are currently used in some Connecticut schools.

Online information retrieval is defined simply as that process whereby one computer communicates over phone lines with another. A growing number of Connecticut schools are using microcomputers to obtain information services from database vendors through subscription or on a pay-as-you-go basis. With each of the schools which will be discussed there were two main purposes for introducing online data retrieval technology to students: (1) the product; and (2) the process.

The "product" is important because much of the information needed by students is not available in traditional print sources such as books, newspapers or magazines, or is obsolete once it is published. Certainly, well-balanced book collections and a wide range of periodicals are essential resources but online databases can serve as a useful complement to these sources. Through the use of online data retrieval vast quantities of information from a wide range of sources can be searched instantly.

The process, however, is as important as the product or content. In a world where access to information is increasingly mechanized, information retrieval skills join the basic "three R's" as essential. Similarly, we know that student motivation and long-term retention are increased if we engage students in higher order thinking skills. The process of online information retrieval is an ideal means for reinforcing what we now refer to as "critical thinking skills". The student must interact with the computer to make several key decisions relative to the choice of database, subject terminology, search words or other access points in a search. It is during this intellectual process that the student has the opportunity to employ higher order thinking skills in order to formulate an effective search strategy, then gather, analyze, synthesize and evaluate the information retrieved.

Prior to beginning use of online data retrieval it is important to consider several factors such as who will be doing the searching, what type of information is sought (both in terms of content as well as format), what type of search access is appropriate for the level of learner (menu-driven, specialized command language, keyword searching, etc.), cost, and staffing implications.

Examination of the experiences in the East Lyme (CT) Public Schools which has just completed its second year of use might best illustrate some of these points. Online data retrieval users have included administrators, staff and nearly every student in both the junior and senior high schools (550 and 1,050 students respectively). Students at all academic levels are using online services. In fact, due to the highly individualized nature of the search process

which is both self-paced and non-threatening, online searching has been particularly successful with reluctant learners. Average and advanced students have taken advantage of increasingly sophisticated search strategies as they became proficient with the process as well.

When a database vendor was sought for East Lyme, the goal was to provide meaningful online data retrieval experiences that were user-friendly (requiring a minimum of training for students to be somewhat independent), menu-driven, cost efficient and full-text. By full-text we mean that a learner retrieves textual information (such as a full encyclopedia or newspaper article) not just a citation or reference to such information.

East Lyme opted for Dow Jones News Service which offers schools their basic menu-driven service for a flat-rate of $125 per month per microcomputer unit. Each Lyme High School has two microcomputers which are logged into Dow Jones a total of four hours daily and the Junior High School maintains one unit for a total cost of $375 per month for the district. Dow Jones offers full-text access to thirty databases including The Academic American Encyclopedia, Peterson's College Search, news, weather and sports from Associated Press (updated continually throughout each day), book and movie reviews, and a wide range of business databases as well.

In addition to the basic menu-driven service Dow Jones offers key-word searching of full-text articles from the Washington Post, Wall Street Journal, and several business periodicals for an additional online access fee of twenty-five cents per minute. With this service students are able to interact with thousands of articles to access information instantly. At East Lyme High School, students use this enhanced searching device to support research in literally every subject area taught such as health, literature, current affairs, psychology, sociology and science, to name a few.

With key-word searching the student can formulate a search using standard English words as they appear in the articles rather than

having to know specialized subject terms. For example, a search of the Washington Post using the word AIDS would yield nearly 3,000 articles. However, the student can then narrow the search by adding other words such as CHILDREN and SCHOOL and ATTENDANCE if that is the aspect of the topic they are researching. Within seconds this would narrow the relevant articles to sixteen which mention all the search words. At this point the student can examine the sixteen headlines to determine which article or group of articles is desired. A simple PRINT command to the printer will produce the complete articles for the student to take home for review.

While students in East Lyme and Redding (Joel Barlow Senior High) are successfully using Dow Jones News Service, other schools have chosen different databases. Quite often the type of service subscribed to is determined by the quantity and quality of the in-house resources of a school or its proximity to external sources of information. Newington High School and East Hartford High School, for instance, opted for services that offer citations or references to sources which complement their collections and can be obtained by students in neighboring library institutions. East Lyme, on the other hand, is not in a major metropolitan area where students can easily reach additional sources, so a full-text database service was more desirable.

Newington High School uses DIALOG which offers 300 separate databases covering a wide range of areas such as economics, business news, scientific, technical, medical, social science and humanities. One of the databases, ERIC, is familiar to educators who wish to obtain the latest findings in educational research. Keep in mind that the search results are citations to journals or abstracts and the user must obtain the complete information from another source although DIALOG does offer some full-text databases. The cost to schools for use of DIALOG is an online fee of $15 per hour and is billed monthly on a per search basis. Users can employ a variety of search strategies from key-word to special subject terms or a combination of both. Since DIALOG searching is rather sophisticated and not easily picked up by inexperienced searchers,

DIALOG had designed special software to assist the student searcher. This service, called CLASSMATE, gives schools access to sixty DIALOG databases at the same cost of $15 per hour.

East Hartford High School subscribes to a citation-based or reference service called WILSEARCH. This service provides online access to all the common Wilson Company indices currently available in print form such as Book Review Digest, Education Index, Social Science Index, and Reader's Guide to Periodicals Index. Students are able to search multiple years of indices using a variety of terms simultaneously, which greatly reduces the amount of time that a traditional manual search would take. East Hartford High is within easy distance of several major libraries and students have no trouble locating the complete documents referenced in the online search. The cost of WILSEARCH varies from $1 to $3 per search depending on how many searches are purchased in advance. Each search yields ten citations.

Another online database provider, EINSTEIN, is used by students at Madison Middle School in Trumbull. EINSTEIN is called a "gateway" service because it walks the user through a series of steps which essentially selects the database appropriate to the search from broad areas such as art, business, English, science, social studies, etc. EINSTEIN draws on over eighty databases from BRS, DIALOG, DataTimes, and WILSONLINE and provides citations, abstracts or full-text articles for a cost of $4.50 per search (and no additional telecommunication costs) or $3.25 (plus twelve cents per minute telecommunication cost). Each EINSTEIN search of the reference database yields eight citations; each abstract search yields eight headings and one full abstract; each full-text search yields eight headings and one full-text article.

Each of the above database services can be accessed using just about any microcomputer readily available in schools. A dedicated phone line is recommended for online data retrieval. Although monthly fees must be paid to the phone company to maintain the phone line, there are usually no long-distance charges for searches since those costs are built into the fee structures cited above.

Schools can purchase fairly inexpensive telecommuniations software from each of the database vendors so that the school microcomputer can "talk" through a modem to the data service, or they may prefer to use a generic telecommunication software program such as ASCII Express. ASCII Express can be pre-programmed with all necessary phone numbers, passwords and log-in protocols to make searching simpler for the end-user.

Based on this author's experience with online data retrieval, it is apparent that no one database service is perfect nor will any one service answer every information need of a given school curriculum, staff or student body. Fortunately the services described above do not require long-term restrictive subscription periods and can in fact be used to complement each other. At East Hartford High, for instance, WILSEARCH is used for general research while DIALOG's CLASSMATE is used by biology students to locate citations in science journals. It is recommended, however, that only one data service be used initially; once staff members become proficient with that service it can then be introduced to students and other data services can be added over a period of time.

This brings to mind the issue of staff development. Continual retraining will be crucial as new data services and technologies become available. The new State requirement for professional development provides a tremendous opportunity for all staff to acquire and maintain online data retrieval skills. Staff development time can also be utilized so library media personnel and classroom staff can work together to integrate these skills into the curriculum. For technical assistance most database services offer training sessions and have very helpful documentation and use guides. In addition, professional organizations such as the Connecticut Educational Media Association offer workshops to media specialists as well as classroom and administrative staff at regular conferences and special workshops. Schools whose library media specialists are CEMA members can obtain a video tape of a recent CEMA-produced teleconference which describes the aforementioned database services by sending a blank VHS tape to Dr. LeRoy Temple at Central Connecticut State University.

In closing it is worth noting that the students entering school for the first time next fall will be the graduating high school seniors of the year 2001. As we ponder the types of skills these students and those in our schools today will need to survive and thrive in the 21st century, it is clear that we have the responsibility to provide them with meaningful online information processing experiences as part of their basic education. It is an exciting challenge.

Eugene Lynch
East Lyme, Connecticut

APPENDIX

Dow Jones News Service
Princeton, NJ 08543
(609) 452-1511

Eugene Lynch
East Lyme High School
(203) 739-6946

DIALOG
Palo Alto, CA 94304
(800) 334-2564

WILSEARCH
H.W. Wilson Company
(800) 367-6770

EINSTEIN
Addison-Wesley Publishing Co.
Reading, MA 01867

John Crowley
Joel Barlow High School, Redding
(203) 938-2508

Marie Shaw
East Lyme Junior High School
(203) 739-4491

Nancy Narsis
Newington High School
(203) 666-5611

William Secord
East Hartford High School
(203) 282-3258

Edward Farrell
Madison Middle School, Trumbull
(203) 452-5164

For CEMA video tape of Online Teleconference -- send blank VHS video tape to:

Dr. LeRoy Temple
Central Connecticut State University
Media Center
New Britain, CT 06050
(203) 827-7263

NOTES